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(54) Reciprocating axial displacement device

(57) A reciprocating axial displacement mechanism is disclosed generally comprising a housing, a rotating device, a displacement device having first and second undulating surfaces disposed in the housing, and a cam connected to the rotating device and disposed between the first and second undulating surfaces. The cam either has an undulating shape or has first and second undulating surfaces such that, as the cam rotates with the rotating device, the cam slides along the first and second undulating surfaces of the displacement device to cause the displacement device to move back and forth along the longitudinal axis of the rotating device. In certain embodiments, the displacement device is a pumping device, or an actuator for a pumping device, in a compressor.

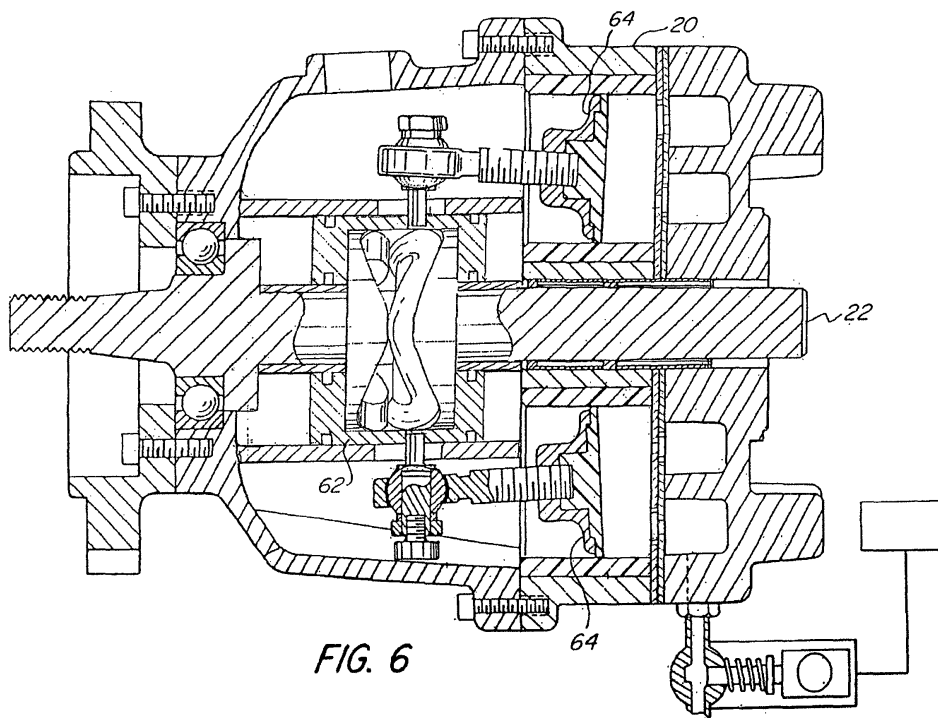


FIG. 6

EP 1 635 059 A3



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 29 02 025 B1 (WOLF ANTON) 3 July 1980 (1980-07-03) * column 3, line 25 - column 9, line 3; figures 1-8 *	1,3,5	INV. F04B35/01 F04B27/10 F16H25/12
X	FR 733 873 A (RONSSE, HENRI-DESIRE-ROCH-AUGUSTE) 12 October 1932 (1932-10-12) * page 1, line 49 - page 2, line 73; figures 1-7 *	1,5-7	
X	FR 2 269 001 A (ETIENNE CHARLES [FR]) 21 November 1975 (1975-11-21) * page 2, line 8 - page 4, line 19; figures 1-4 *	1	
X	DE 596 920 C (HIMMELWERK AG) 12 May 1934 (1934-05-12) * page 1, line 41 - page 2, line 24; figure 1 *	1	
X	WO 99/53222 A (SCHALLER PAVEL [CZ]; BANDAS JAROSLAV [CZ]) 21 October 1999 (1999-10-21) * pages 4-9; figures 1-10 *	1,7	TECHNICAL FIELDS SEARCHED (IPC) F16H
A	GB 462 666 A (EMILE DIRIX) 9 March 1937 (1937-03-09) * page 1, line 67 - page 3, line 5; figures 1-5 *	1-17	
A	FR 370 319 A (PENSO, JOHN ANTHONY) 4 February 1907 (1907-02-04) * page 1, line 51 - page 2, line 38; figures 1-5 *	1-17	
		-/--	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 October 2007	Examiner Lord, Gareth
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

2

EPO FORM 1503 03.82 (P04C01)



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EUROPEAN SEARCH REPORT

Application Number
EP 05 01 9722

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 320 171 A (WILCOX KEVIN [GB]; HOPPER ALAN INGLEDEW [GB]) 14 June 1989 (1989-06-14) * abstract *	1-17	
A	EP 0 120 147 A (TEN HOLDER JOHANNES HENRICUS M) 3 October 1984 (1984-10-03) * abstract *	1-17	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 October 2007	Examiner Lord, Gareth
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

2

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 01 9722

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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05-10-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 2902025	B1	03-07-1980	NONE
FR 733873	A	12-10-1932	NONE
FR 2269001	A	21-11-1975	NONE
DE 596920	C	12-05-1934	NONE
WO 9953222	A	21-10-1999	AU 8726798 A 01-11-1999 CZ 9801128 A3 17-11-1999
GB 462666	A	09-03-1937	NONE
FR 370319	A	NONE	
EP 0320171	A	14-06-1989	GB 2213549 A 16-08-1989 JP 1237301 A 21-09-1989
EP 0120147	A	03-10-1984	NONE

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82